

Notice of Allowability

Application No.

09/726,752

Examiner

Nikolas J. Uhler

Applicant(s)

JONGILL ET AL.

Art Unit

1773

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 02/02/2004.
2. ☒ The allowed claim(s) is/are 1-7 and 9-14.
3. ☒ The drawings filed on 11/30/00 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
 - * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 03/02/2004.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Joe Fox on 03/02/2004.

The application has been amended as follows:

Claim 11: line 13: deleted "a metal layer lamination step of laminating a metal layer comprising a metal on the free magnetic layer laminated in said free magnetic material lamination step; and a plasma oxidation step of exposing the metal layer laminated by said metal layer lamination step to oxygen in the plasma state to oxidize the metal layer."

Claim 11: line 12: inserted -- a metal layer lamination step of laminating a copper metal layer on the free magnetic material layer laminated in said free magnetic material layer lamination step; and a plasma oxidation step of exposing the copper metal layer laminated by said metal layer lamination step to oxygen in a plasma state to oxidize the copper metal layer and form a copper oxide layer, and wherein the copper oxide layer causes specular reflection on, without applying a bias magnetic field to, an interface between the copper oxide layer and the free magnetic layer when the copper oxide layer is formed on the free magnetic layer. -- **after** "said free magnetic layer on the middle layer;"

Claim 12: line 2: inserted -- copper -- **between** "oxidizing said" and "metal layer"

Claim 12: line 3: inserted -- copper -- **between** "side of the" and "metal layer"

Claim 13: line 3: inserted -- copper -- **between** " new layer on said" and "metal layer"

Claim 14: line 14: inserted -- copper -- **before** "oxidation control layer"

Claim 14: line 19: deleted "oxidation control layer." and **inserted** -- oxidation control layer and form a copper oxide layer on said free magnetic layer, and wherein the copper oxide layer causes specular reflection on, without applying a bias magnetic field to, and interface between the copper oxide layer and the free magnetic layer when the copper oxide layer is formed on the free magnetic layer. -- therefor.

Rejoinder of Withdrawn Claims

2. Claims 1-7 and 9-10 are directed to an allowable product. Pursuant to the procedures set forth in the Official Gazette notice dated March 26, 1996 (1184 O.G. 86), claims 11-14, directed to the process of making or using the patentable product, previously withdrawn from consideration as a result of a restriction requirement, are now subject to being rejoined. Claims 11-14 are hereby rejoined and fully examined for patentability under 37 CFR 1.104.

Since all claims previously withdrawn from consideration under 37 CFR 1.142 have been rejoined, the restriction requirement made in the office action dated 12/17/2002 is hereby withdrawn.

Reasons for Allowance

1. The following is an examiner's statement of reasons for allowance: The closest prior art to that of the instant invention is US6490139 (Hayashi et al.) in view of US5897969 (Taniyama et al.). This combination of references teaches a magnetoresistive film having the same structure as that required by the instant claims. However, it is noted that the CuO layer in this combination forms a biasing layer (see Hayashi column 7, lines 60-67 and Taniyama, column 14, lines 53-55). These biasing layers apply a biasing magnetic field to the free layer in order to cause the free layer to have a stable magnetic domain (column 7, lines 60-67). Thus, as CuO can be non-magnetic or antiferromagnetic depending on its composition, it is clear from the use of the CuO layer as a biasing layer that Hayashi and Taniyama require the CuO to be antiferromagnetic. The CuO layer in the instant application is utilized as a specular reflection layer, which causes specular reflection on, without applying a biasing magnetic field to, and interface between the free magnetic layer and the oxide layer. Thus, the CuO in the instant case is required to be non-magnetic. There is no teaching or motivation in the prior art that would motivate one of ordinary skill to modify the prior (antiferromagnetic CuO) art so as to arrive at the instantly claimed invention (non-magnetic CuO).

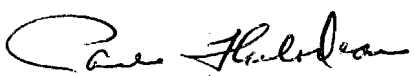
2. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nikolas J. Uhlir whose telephone number is 571-272-1517. The examiner can normally be reached on Mon-Fri 7:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul J. Thibodeau can be reached on 571-272-1516. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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